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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/736,654	12/12/2000	Ron Kimmel	10990172-1	8266

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EXAMINER

KIM, CHONG R

ART UNIT PAPER NUMBER

2623

DATE MAILED: 01/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/736,654

Applicant(s)

KIMMEL ET AL.

Examiner

Charles Kim

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 September 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-20 and 22-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 2-11, 17-20, 22 and 23 is/are allowed.
- 6) ☒ Claim(s) 12-16, 24-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment and Arguments

1. Applicant's amendment filed on September 30, 2005 has been entered and made of record.
2. Applicant's arguments have been fully considered, but they are not deemed to be persuasive for at least the following reasons.

Applicants argue that their claimed invention (claims 12 and 24) differs from the prior art because "Borgefors fails to disclose that a first distance map is downsampled to form a second distance map." The Examiner disagrees. Borgefors clearly explains that the DT (distance transform) is implemented in a pyramid structure (page 692, first paragraph). Borgefors also explains that the pyramid structure is created by setting each block of four values to a single value. Thus, the distance map is downsampled to a second resolution (see figure 2 on page 696).

Applicants further argue that their claimed invention (claim 16) differs from the prior art because "Danielsson computes distances from pixel centers to centers of boundary pixels that reside on a pixel grid." The Examiner would like to point out that the Danielsson reference was not relied upon to reject claim 16. Instead, the article entitled "Skeletonization via Distance Maps and Level Sets" by Kimmel et al. ("Kimmel") was applied in combination with Borgefors. It appears that the Applicant intended to say that Kimmel computes distances from pixel centers to centers of boundary pixels that reside on a pixel grid. In that case, the Examiner disagrees. Kimmel clearly explains that the distance measurements of boundary pixels are implemented in a numerical approximation scheme and thus, *do not suffer from the typical errors caused by use of*

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errors caused by use of a grid (abstract). Kimmel also explains that the distance calculations made using the numerical scheme produces *subpixel accuracy* (abstract).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 12, 15, and 24 are rejected under 35 U.S.C. 102(e) as being anticipated by “Using Resolution Pyramids to Efficiently Store Distance Transforms of Arbitrary Size” by Gunilla Borgefors (hereinafter “Borgefors”).

Re claims 12 and 24, Borgefors discloses a method comprising the steps of computing a first distance map of a source image (p. 691, first paragraph), and downsampling the first distance map having a first resolution to form a second distance map having a second resolution (p. 692, lines 4-7 in first paragraph and 5th full paragraph).

Re claim 15, Borgefors discloses the first resolution is greater than the second resolution. (resolution pyramids have the parent with greater pixels than the child).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 13-14 and 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Using Resolution Pyramids to Efficiently Store Distance Transforms of Arbitrary Size" by Gunilla Borgefors (hereinafter "Borgefors").

Re claims 13 and 25, Borgefors does not mention applying a soft threshold filter to the second distance map. However, a soft threshold filter may be a noise filter to remove any errors from the source image map having the second resolution. Therefore it would have been obvious to use any type of threshold filter to filter the image of Borgefors to remove unwanted noise or errors, as broadly claimed.

Re claims 14 and 26, Borgefors does not disclose interpolating the second distance map to generate an interpolated distance map having the first resolution. However, it is well known in the art to reconstruct a downsampled image by interpolation. Therefore it would have been obvious to modify Borgefors to interpolate the second distance map to generate a distance map of the first resolution. Borgefors further does not mention applying a soft threshold filter to the interpolated second distance map. However, a soft threshold filter may be a noise filter or smoothing filter to remove any errors from an image. Therefore it would have been obvious to

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use any type of threshold filter to filter the image of Borgefors to remove unwanted noise or errors, as broadly claimed.

5. Claim 16 is rejected under 35 U.S.C 103(a) as being unpatentable over "Using Resolution Pyramids to Efficiently Store Distance Transforms of Arbitrary Size" by Gunilla Borgefors (hereinafter "Borgefors") as applied to claim 12 in view of "Skeletonization via Distance Maps and Level Sets" by Kimmel et al (hereinafter Kimmel).

Re claim 16, Borgefors discloses generating a distance map, but does not mention the distance is to sub-pixel accuracy as claimed. Kimmel teaches identifying a boundary curve of a source image (abstract line 4-5) and assigning a distance value to each pixel of a distance map (abstract lines 5-6), which the distance is between a center of the pixel and the nearly boundary curve (p. 382, right column, lines 15-16), wherein the nearest point is located to sub-pixel accuracy (abstract line 11-12). Therefore, it would have been obvious to use the calculations of generating a distance map to a nearest boundary curve to sub-pixel accuracy as taught by Kimmel to provide a more accurate representation of the object.

Allowable Subject Matter

6. Claims 2-11, 22-23 are allowed.

7. Claims 17-20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

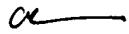
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles Kim whose telephone number is 571-272-7421. The examiner can normally be reached on Mon thru Thurs 8:30am to 6pm and alternating Fri 9:30am to 6pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu can be reached on 571-272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-272-8300.

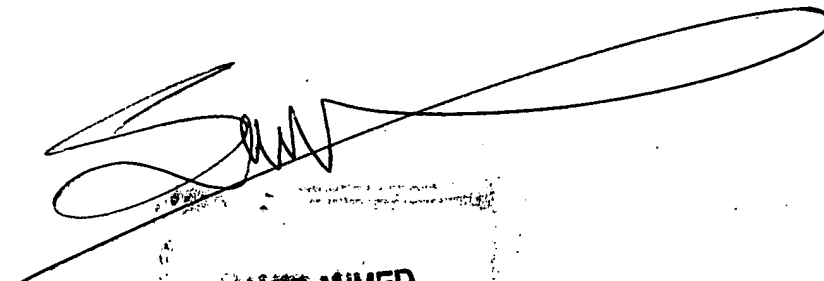
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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



ck

January 5, 2006


SAMIR AHMED
PRIMARY EXAMINER